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BY

WM. E. PRAEGER

INSTRUCTOR IN BIOLOGY

TOWNSHIP HIGH SCHOOL

STREATOR, ILLINOIS

From the Transactions of the Illinois State Horticultural Society

New Series, Vol. XXXIII

1899

Reprinted for the Illinois Audubon Society, Jan., 1902

RUTHVEN DEANE, Prest.,
Chicago, Illinois

MISS MARY DRUMMOND, Secy.,
Wheaton, Illinois

LEAFLET No. 7—PRICE PER 100, $1.25

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Mr. President, Ladies and Gentlemen :—Progress in the science of horticulture is marked by an increasing appreciation of the value of what is common, and at first sight trivial and unimportant. We are sure to remember the long drouth, the severe storm or the deep snow. A destructive flood will be talked of generations to come. But the gentle showers are soon forgotten, while it is only by investigations of science that we are made aware of the moisture that is ever present in the surrounding air. Yet the flood is usually of little material interest, a few weeks and all trace of it has disappeared; but the atmospheric moisture cannot be spared for a single day if vegetation is to exist on the earth. It is by slow degrees and patient labor that we are learning to appreciate the forces that are ceaselessly at work around us, the intricacy of the great machine, the nicety of its balances and adjustments. Only when it temporarily acts to our loss or inconvenience—a consummation not infrequently brought about by our own ignorance or folly—do we realize the mighty influences that are constantly and silently ministering to our good.

Among the many plagues which poor humanity has endured history records the losses caused by flights of birds; and in our own day we hear complaints from the growers of corn or fruit of injury to their crops. Indeed there are a few of us who have not noticed the oriole pecking grapes or the robin stealing cherries, and we are sure to remember the day when the hawk visited our hen-yard. We notice these events as we would the flood or storm; but how little we think of the birds' actions from day to day, and how rarely do we ask the questions:—have the birds a distinct place in nature's economy; are they, too, a part of this great machine, and perhaps as essential to our welfare even as the rain or sunshine?

We must therefore endeavor to determine if the birds, by reason of their numbers and activities are able to produce a marked effect on other forms of life, animal or vegetable; and, secondly, if this influence is for the benefit of horticulture or otherwise.

Our state supports a really dense bird population. Even in the depths of winter birds are not rare; the hawk sails overhead and crows flap across the dreary landscape; woodpeckers and chickadees haunt the orchard and wherever a clump of weeds shows above the snow, are flocks of snow-birds and winter-sparrows. But by February, if the weather be mild, new voices are heard, and in any case March will not be far advanced before every field, wood and garden is filled with the music of the birds; soon the rivers fill up with ducks and the marshes with snipe; each week brings new species of finches, sparrows, thrushes, who as they pass must glean a living from the farms where spring work is now in progress. When the leaves burst forth, cover is afforded for a host of warblers, vireos and fly catchers. May is nearly over before the great spring migration is past. Most of these birds have spent only a few weeks or days within our state; but while a great host has gone to spread over the lands to the north, many remain to build their nests and rear their young in our midst. These summer residents are to be with us for some months and we have thus

a chance to estimate their numbers. Several experienced field naturalists, on being asked their opinion as to the number of birds breeding within this state, agreed that three to the acre would be a conservatave estimate. This would mean about fifty-four million pairs; each nest will contain say, on an average, five young, and most birds raise more than one brood in the season; so, even allowing for the great destruction of eggs and young, the number of birds' mouths to be fed, during the summer months, on the farms of Illinois, must amount to hundreds of millions.

Before the summer is past the migratory movement again shows itself. Each night that a cool north wind is blowing the flights of birds pour into our state. It is probably about the 1st of September that our bird population has reached its maximum, but still they come and go, and the last red leaf of autumn has fallen before the waves cease to sweep over our land. How many birds, in this annual cycle, have lived within our state we cannot estimate; but surely the number is enormous, and not the smallest patch of ground, not a single tree or shrub, remains unvisited.

Birds are fast livers. Their activities are immense; their hearts beat twice as fast as those of man; the temperature of their blood would be to us fever heat. To support such vitality a relatively enormous amount of food is required; and this, too, of the most nutritious kinds, such as grain, seed or animals. Even a greater amount than is consumed by the adult is needed by the young, for while in the nest the rate of growth is very great. As an example of this we may take some recently published observations on the growth of a nest of young song-sparrows. Each day the brood was carefully weighed and the increase noted. During the first day the average gain in weight of the nestlings was forty-eight per cent, and in six days their weight was very nearly trebled. Such growth needed indeed the constant attention of the parent birds, who, on an average, visited the nest at intervals of from two to five minutes from daybreak till dark. Take our fifty-four million pairs of breeding birds within the state of Illinois, say that one-third of these have young at any one time, let the parents visit the nest with food every five minutes; the bases we take are conservative enough, yet it means thirty-four hundred million meals furnished to the infant birds of the state each day during the breeding season.

Professor Treadwell has recorded the case of a young robin that he kept in confinement and fed on earth worms. The weight of the bird was taken each day and also that of the food consumed. He found that it lost in weight though he increased the daily allowance from ten to fifteen, twenty-four, twenty-five and thirty worms; it was not until the fourteenth day when he gave it sixty-eight worms weighing thirty-four pennyweights that the bird throve and increased in bulk. On that day the bird itself weighed twenty-four pennyweights, so that it consumed forty-one per cent more than its own weight in twelve hours.

The amount of food that has to be supplied by the old birds might well inspire human parents with horror and consternation. Yet so rapid is the growth of the nestling, so intense the vital fire within its little body, that it is evident even this quantity would not suffice unless it were of the most nutritious kinds. Of the more essential food constituents, such as proteids and carbohydrates, fruits contain a very small proportion and these substances must be sought elsewhere; and hence the young birds' food must of necessity, and as proved by observation, does consist principally of soft-bodied insects.

About the first extensive scientific work on the relation of birds to agriculture and horticulture was done within our own state by our present state entomol-

ogist ; and to give you some further proofs of the power exercised by the birds I can do no better than quote from one of his papers published in 1880. Taking three birds to the acre as a basis he continues : "It is my own opinion that about two-thirds of the food of birds consists of insects, and that this insect food will average, at the lowest reasonable estimate, twenty insects or insects' eggs per day for each individual of the two-thirds, giving a total for the year of 7,200 per acre, or about two hundred and fifty billions for the state.

"Estimates of the average number of insects per square yard give us, at the farthest, ten thousand per acre for our whole area. On this basis, if the operations of the birds were to be suspended, the rate of increase of these insect hosts would be accelerated by about seventy per cent ; and their numbers instead of remaining year by year at the present average figure, would be increased over two-thirds each year. Anyone familiar with geometrical ratios will understand the inevitable result. In the second year we should find insects nearly three times as numerous as now, and in about twelve years, if this increase was not otherwise checked, we should have the whole state carpeted with insects, one to the square inch over our whole territory. I have so arranged this computation as to exclude the insolvable question of the relative value of the birds and predaceous or parasitic insects, unless we suppose that birds eat an undue proportion of beneficial species.

"Let us take another view of this matter. According to the computation of our first state entomologist, Mr. Walsh, the average damage done by insects in Illinois amounts to twenty million dollars a year. These are large figures, certainly; but when we find that this means only about fifty-six cents an acre, we begin to see their probability. At any rate, few intelligent farmers or gardener would refuse an offer to insure complete protection year after year, against insects of all sorts for twenty-five cents an acre per annum; and we will, therefore, place the damage at one-half the above amount—ten million dollars per annum.

"Supposing that, as a consequence of this investigation, we are able to take measures which shall result in the increase by so much as one per cent of the efficiency of birds as an insect police, the effect would be a diminution of the above injury to the amount of sixty-six thousand dollars per annum, equivalent to the addition of over one and one-half million dollars to the permanent value of our property; or if, as in fact a most moderate estimate, we should succeed in increasing the efficiency of birds five per cent, we should therefore add eight and one-fourth million dollars to the permanent wealth of the state, provided, as before, that birds do not eat unduly of beneficial species."

Professor Forbes adds that "these figures will be at once rejected by most naturalists as absurdly low" and in this also I must heartily agree with him. But whether low or not I hope what I have said will convince you that in the birds we have one of the great and constantly acting forces of nature; that any disturbance in the action of this force must have widespread consequences, and if the interference is of any magnitude, such as a marked diminution in the number of birds in a given locality, the consequences would inevitably be serious and would probably be manifested in a disaster to ourselves.

The results that would follow such a disturbance of nature's economy as here suggested rest on no fine drawn theories but on actual historic experiences. Before the days of scientific investigation enactments against the birds as destroyers of fruit and grain were not rare. In 1820, Bridgewater, Mass., successfully exterminated

the greater part of her bird population, deterioration of nearly all crops was the immediate result and the policy toward the birds was quickly changed. In Virginia and Carolina at one time war was especially waged on the woodpeckers till it was found that the forests and orchards were suffering from wood-boring insects. During the French-Revolution guns came for the first time into the hands of the people and great scarcity of food prevailed, so all birds were indiscriminately shot; the effects on orchards, fields and vineyards were soon so apparent that, in many districts, stringent laws for their protection were enforced. Prussia once, believing it would benefit agriculture, ordered a tax of twelve birds heads to be paid annually by each farmer; it took Prussia just two years to learn by sad experience the error of her ways. I could enumerate many such instances. Even within the present decade a committee of the House of Commons, appointed to investigate a plague of the field mice that was destroying the crops in several counties in the British Isles, reported that it was chiefly due to the scarcity of owls and hawks, and recommended the protection of birds of prey.

We of Illinois may congratulate ourselves that birds have not disappeared from our land as they have from other less fortunate districts. It is true birds are fewer than they used to be, but this decrease is chiefly among the larger species. Lovers of nature may regret that so many interesting forms are disappearing, and the increasing scarcity of game birds and waterfowls will deprive us of an important food supply; but it is the small birds of the field and orchard in which the farmer is most interested and these, save in a very few localities, are practically as numerous as ever. But the same causes are now at work that have elsewhere produced such serious consequences. Our population is increasing, our cities are growing, the prairies are tilled, the woods and marshes are disappearing. Whatever its effect on the birds we look with righteous pride on the material growth of our state. But there is another side to the picture on which we must look with feelings far otherwise than pride. Cheap firearms are everywhere, birds are shot indiscriminately for "the fun of the thing," many thousands are slaughtered for millinery purposes, Italians and others who eat anything that wears feathers, however small, are congregating in many of our towns, nests innumerable are destroyed by youthful egg collectors. In the face of such wanton destruction it is time the friends of the birds should bestir themselves for it is an old saying that "prevention is better than cure."

But, it might well be asked, while granting the importance of birds, and their benefit on the whole to horticulture, are there not certain species that could well be spared, special crops that birds materially injure, or particular times of the year when their presence in our orchards and gardens is entirely harmful? To answer such questions the subject must be approached in more detail.

How are we to tell what a bird eats? We can whatch the birds and by patient observation determine much of their habits. Many important contributions to science have thus been made, but for our present purposes it gives uncertain and one-sided results. We cannot in most cases be sure we really see what a bird is eating and it is usually impossible to follow its movements long or tell of what its food as a whole consist. Birds can be kept in confinement and their habits there will teach us many lessons, but this method is quite too narrow and artificial for our purpose. The method of research most frequently used, and that it is now agreed gives the most complete and reliable results, is the examination of the stomach contents of the dead bird. This has been well called "the court of final ap-

peal." The process is not without its difficulties. The contents of the stomach are usually mixed, broken and partly digested and in the poorest possible shape for examination. To tell what the fragments once belonged to they have to be carefully cleaned, sorted and examined under a microscope by skilled experts in entomology, botany and other branches of science. Still in spite of all difficulties a great amount of work has been done, and within the last few years the farmer has been furnished with a safe and scientific basis for his policy towards the birds.

With the great majority the good they do is so great and the harm, if any, so trifling, that encouragement and protection will freely be given them at all times. This will include—if we except the English sparrow—all our smaller birds; the warblers, vireos, flycatchers, wrens, chickadees, bluebirds and many others. But there are a few, usually the larger species, that do not bear this unsullied reputation, and these must have our special attention.

Gardeners have long looked on the robin with suspicion; its abundance, its size, its boldness in entering our gardens and orchards, render it quite a factor for the weal or woe of the fruit grower; so it has received an unusual share of attention from investigators. Even when the snows of winter linger late the robins come at their appointed time and content themselves with last year's sumach or wild grapes. Once the lawns are clear they descend to them and subsist chiefly on fly larvae. Of these 175 have been counted in a single stomach. As the season advances the diet is more varied, larvae of many kinds, beetles, grasshoppers and other ground insects receiving attention. During March twenty per cent of their food is cutworms; in April beetles are often in the majority; but up to the end of May, ninety-five per cent of their food is insects. Then comes a change. During June—I use figures compiled for our own state—fifty-five per cent is fruit, in July this figure rises to seventy-nine per cent, in August it is fifty-six but more than half of this is wild cherries. For the balance of the year fruit predominates, wild grapes being most favored but forty-one different kinds of wild berries have been found in the stomachs. For the whole year sixty-five per cent of the food is insects, twenty-five domestic and ten per cent wild fruit. Of the insects we find that forty-three per cent are injurious and thirty-six per cent beneficial species, while twenty-one per cent are neutral. The question becomes very complicated for we would not only have to know the value of the fruit, but the damage done by the injurious species, including those that would have been destroyed by the beneficial species, and other details, all reduced to dollars and cents. It is evident we cannot enter on this subject here, but it has been worked out thoroughly and carefully elsewhere, and in concluding an exhaustive paper on the subject Professor Forbes says: "I, for my part, do not believe that the horticulturist can sell his small fruits anywhere in the ordinary markets of the world at so high a price as to the robin, provided he uses proper diligence that the little huckster does not overreach him in the bargain."

The brown thrush or thrasher eats proportionately half as many more insects than does the robin. This difference comes in the fall when it takes its share of grasshoppers in place of the wild fruit preferred by its associate; its fondness for May-beetles also deserves favorable mention.

The catbird prefers other kinds of fruit and insects and therefore fills a different place from the robin or thrasher in horticultural economy. But the proportions of gain or loss on its account are quite similar, though on the whole it is not so beneficial. Less than a fifth of its food consists of cultivated fruits, these being chiefly raspberries and blackberries; and more than half of beetles, ants, grasshoppers and

other insects. The catbird in the central states is more complained against than any other bird and not without reason, but along the sea-coast it is considered purely beneficial.

The well known meadowlark is a bird of the field and so does not much affect horticulture directly; seventy-three per cent of its food is animal and twenty-seven vegetable, nearly all of the latter being the seeds of weeds. A careful estimate of its value as a destroyer of grasshoppers shows that on this account alone each meadowlark is worth $1.20 per year to the farmer.

Our beautiful oriole or firebird has been indicted as a destroyer of fruit, especially grapes; investigations seem to show that these accusations are mostly unfounded. In the stomachs examined were occasionally a few raspberries, rarely any other fruit, and, strange to say, no trace of grapes. Of its food eighty-three per cent is insects, mostly injurious species, no less than thirty-four per cent being caterpillars. The oriole is a bird of the trees, its whole life is spent in them, it ought to be a great favorite with the horticulturist.

The cedar-bird or cherry-bird is supposed to have received one of its common names from a vicious habit of eating cherries. As a matter of fact it probably eats more fruit than any other bird we have, but only thirteen per cent of this is cultivated, the wild varieties forming its staple diet. This "cherry-bird" makes five per cent of its meals on cherries. It has some excellent traits, take this for an example. A flock of about thirty cedar-birds frequented an orchard in Tazewell county, infested by canker worms. Seven of these were shot and their stomachs examined, it was found that the entire food of these birds consisted of canker-worms. The number in each stomach, determined by actual count, ranged from seventy to one hundred and one and was usually nearly a hundred. Assuming that these constituted a whole day's food, the thirty birds were destroying three thousand worms a day or 90,000 for the month during which the caterpillar is exposed.

That swaggering fellow, the bluejay seems desirous of making a bad impression, but the fact is he is a great blusterer; it is only on rare occasions that he robs other birds' nests and the amount of fruit he consumes is trifling. His favorite food is acorns, beechnuts and chestnuts varied with some waste corn and wheat. Grasshoppers, caterpillars and beetles form one-fourth of his food. A pair of jays is certainly an acquisition to any orchard.

Woodpeckers come in for plenty of abuse. They are accused of injuring the bark of trees, stealing fruit, pecking apples, robbing the nests of other birds and so forth. There are nine or ten of these interesting birds recorded from our state, but only six species are sufficiently common to deserve mention here. They do all peck wood, as their name implies, but with five of our species this is only to get at the injurious insect within, and they are thus conservers of forests and orchards. One species however, the yellow-bellied woodpecker or sapsucker does eat largely of the soft inner layer of bark—the cambium layer—and girdles trees to obtain the sap. Where the bird is abundant it can do real injury, but here it is the least common of the six species. In our northern counties it is a rare breeder and through the rest of the state a not very common migrant, wintering in the southern section. Besides cambium and sap, it preys largely on insects and seems never to touch domestic fruit, so with us it is likely a beneficial bird.

The hairy and downy woodpeckers and the flicker are among our most valuable birds. The red-bellied or zebra woodpecker only a little less so. The red-headed woodpecker occasionally takes fruit and is almost the only bird we

have that ever touches apples; but if it can get beechnuts or acorns the orchard will not suffer. In any case the good it does as an insect destroyer will outweigh any injury. It is a familiar bird, coming near our houses where it shows itself more than a match for the English sparrows; "conspicuous with its gay tri-color plumage, and a great genius, no less brilliant and versatile in character than in plumage."

The birds that are with most justice accused of injury to agriculture are our crow, blackbird and marsh blackbird, but this is to corn and grain and not to fruit. I will, therefore, not dwell on them here except to say that they all have many excellent qualities, for the greater part of the year they are positively beneficial, cases of serious loss are local, and in most districts the good they do will be worth all the corn they take.

There is indeed only one bird commonly seen about our orchards that could well be spared. I refer to the English sparrow. It is a bold aggressive bird, at home everywhere, adapting itself to its surroundings eating a little of everything. It has been accused of many high crimes and misdemeanors. No bird ever had such a thorough and impartial trial. It is out of the question for me to give even a summary of the evidence, I must refer you to the voluminous reports of the Department of Agriculture; but the verdict has been pronounced and is—guilty. The harm it does outweighs the good.

You will see by this time that the question of profit or loss is by no means an easy one, even with a pretty thorough knowledge of what the bird usually eats. Nearly all birds are more or less omnivorous and the food will vary with the locality and the season; in short it will depend chiefly on the kind of food the bird can obtain.

This brings us to an important point that must not be overlooked. It is well known that the principal injuries done by insects are due to a species, or several species, existing for a time in a given locality in numbers far above the average. When such an increase is very marked the papers herald the news over the whole country, but it is certain that such oscillations in the insect population are constantly going on. To check these before they have reached a dangerous magnitude is one of the chief duties of the birds. The appreciate the numbers of a particular insect long before we do and take advantage of the supply of food thus offered. In this way many an increase of an injurious species is checked in its inception. Those whose habits are otherwise very different assist in this work. In the orchard before mentioned, infested by canker worms, birds were unusually abundant and those of the most varied character and habit were feeding on the worms; thirty-five per cent. of all their food consisted of this single species. During a recent plague of Rocky Mountain locusts in the West it was found that practically every bird of the region was feeding upon them.

While nearly every bird will pitch in and help when danger threatens, yet in ordinary times each has its place and a particular duty to perform. The ground is dug, wood is chiseled, fields are patrolled, weed patches are searched, trees, from the gnarled trunk to the tips of the most slender branches, are explored; a host of skirmishers sweep the air. The endless variety, in size and shape, form of bill and length of wing, has a deep meaning for us. We have many kinds of birds because there are many different things for them to do. It is questionable if one of the three hundred species found in Illinois could become extinct and a marked effect not be produced on the abundance of some other form of life; though we might

not in every instance be able to see it. In our investigations we often find an insect that is immune from the attacks of most birds, yet some enemy is to be found to hold it in check. For instance, our potato-bug belongs to a family of insects many of whom possess a repellant odor or taste so that most birds will not touch them, but we have one bird, the rose-breasted grosbeak that is especially partial to this food and will prey on the potato-bug as long as it can be had. The common woolly caterpillars we know so well seem usually to find their hairs an effectual protection, but our two species of cuckoos or rain-crows feed on them by preference. Our crow can, by his superior strength, break clods, and turn over sticks and stones in search for grubs that are safe from the attacks of weaker birds. Thus each has a place to fill; we not only need plenty of birds, but plenty of kinds of birds to secure efficient protection.

Yet it is a fact beyond dispute that birds can occasionally do considerable damage and it may well be asked if these aggressions must be patiently endured for the good they do at other times and in other places. But surely we have ingenuity enough to devise means of checking the evil without limiting the possibility of good. The danger from birds is confined to a certain period in the maturing of the crop. Usually this time is of short duration. Protect the crop during this critical period and the question is solved. It is evident that for this purpose the gun is a clumsy and expensive weapon, the old fashioned scarecrow was after all much more scientific. It must be remembered that on the prairie wild berries were never common, and as the country comes under cultivation they are getting still more rare. Throughout the greater part of the United States wild fruits are in far greater abundance than with us, while orchards and gardens are not less common. It is therefore of great interest to compare the habits of Illinois birds in this respect with the general habits of the species.

Of the total food of the robin in Illinois twenty-five per cent is cultivated and ten per cent wild fruit, in the whole United States the average is four per cent cultivated and forty-seven per cent wild. The propotions are thus completely reversed. The figures for the brown thrush are no less surprising, twenty per cent cultivated and two per cent wild in Illinois to eight per cent cultivated and twenty-five per cent wild for the whole country. The catbird eats forty-one per cent cultivated and five per cent wild with us against nineteen per cent cultivated and thirty-six per cent wild for the United States. Taking the average for these three birds we find of all the fruit they eat in Illinois eighty-three per cent is cultivated and in the United States only twenty-two per cent, and this in spite of the fact that the total amount of fruit of all kinds consumed averages one-fifth greater than with us. There must therefore be some peculiar condition here to make these birds four times more injurious to the garden than they are elsewhere in their range. Only one reason seems possible, that it is due to the scarcity of wild fruits in Illinois.

Were a supply of berries of kinds worthless to us but prized by the birds, at hand, the pressure on domestic fruits would be greatly relieved. For instance if a few trees of the Russian mullberry were planted, preferably in our hen yards or hog runs, the chickens and hogs would appreciate them, and they would produce plenty of fruit of little value to us and yet offer the robins and catbirds a supply of food just when our cherries are ripe, and doubtless thus save many a berry for ourselves. Later in the season wild berries are more abundant and garden fruits suffer less, but still we should see that there is a supply of the former within reach. At this season water is often scarce and fruit juices may be the best substitute ob-

tainable. It has been observed that it is in years of drought that the fruit and especially grapes, suffer most; in such seasons water should be supplied where the birds can use it.

Birds have different tastes from men, as a rule they prefer bitter, sour or insipid fruit. We should never destroy such species as the wild-cherry, wild-grape, elder, hackberry, juneberry, mullberry, dogwood, virginia-creeper. buckthorn, sumach, bitter-sweet, and others. I believe by encouraging such plants we are approaching a solution of the problem, that will preserve for our own benefit both the cultivated fruit and the birds.

Realizing their importance to the agricultural interests of our state the legislature has recently enacted laws for the better protection of the birds, which are on the whole well conceived and ought to do much good. Yet we know that no law dealing with such a subject will or can be enforced without strong popular sentiment to support it. This can only come with a knowledge of the habits and the value of the birds; a greater diffusion of this knowledge among our people is most earnestly to be desired. Through the numerous agencies for education at work within our state this can and must be done.

But I would be doing a great injustice to my subject were I to limit the beneficial influence of the birds to the field and garden. No common drudges are they, sullenly working for a daily wage, but they come brightly clad and with joyous voices to their appointed task. With man alone they share that wonderful power of song, their speed and grace of movement fill us with admiring envy, the exqusite colors and texture of their plumage are unequaled among created things; they appeal to our best æsthetic sense. And in their lives we see beings gifted with a high order of intelligence, teaching us love, courage, constancy, maternal care, devotion to duty. There is not one of us but may learn a lesson from the birds. So when winter comes, and the crops are gathered in, and the little workers wing their way toward their southern homes, let us bid them farewell, not only as good and faithful servants worthy of their hire, but as true and helpful friends, admired and loved, who have brought wealth, health, joy and beauty into the lovely land of Illinois